IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of LAURENCE GERMOND-ROUET ET AL.	Atty. Docket FR 020142
	Confirmation No. 8956
Serial No. 10/538,621	Group Art Unit: 3768
Filed: JUNE 10, 2005	Examiner: WEATHERBY, E.

Title: ULTRASONIC APPARATUS FOR ESTIMATING ARTERY PARAMETERS

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APPEAL BRIEF

Sir:

Appellants herewith respectfully present a Brief on Appeal as follows, having filed a Notice of Appeal on November 25, 2008, where a Petition to Revive is concurrently filed herewith:

REAL PARTY IN INTEREST

The real party in interest in this appeal is the assignee of record Koninklijke Philips Electronics N.V., a corporation of The Netherlands having an office and a place of business at Groenewoudseweg 1, Eindhoven, Netherlands 5621 BA.

RELATED APPEALS AND INTERFERENCES

Appellants and the undersigned attorney are not aware of any other appeals or interferences which will directly affect or be directly affected by or having a bearing on the Board's decision in the pending appeal.

STATUS OF CLAIMS

Claims 1-7 and 9-17 are pending in this application, where claim 8 had been canceled. Claims 1-7 and 9-17 are rejected in the Final Office Action mailed in January 25, 2008. This rejection was upheld, in the Advisory Action that was mailed on October 28, 2008. Claims 1-7 and 9-17 are the subject of this appeal.

STATUS OF AMENDMENTS

Appellants filed on March 19, 2008 an after final amendment in response to a Final Office Action mailed January 25, 2008. The after final amendment included amendments to independent claims 1 and 13. In an Advisory Action mailed on October 28, 2008, it is indicated that the after final amendment filed on March 19, 2008 will be entered but does not place the application in condition for allowance. This Appeal Brief is in response to the Final Office Action mailed January 25, 2008, that finally rejected claims 1-7 and 9-17, which remain finally rejected in the Advisory Action mailed on October 28, 2008.

SUMMARY OF THE CLAIMED SUBJECT MATTER

The present invention, for example, as recited in independent claim 11, is directed to an ultrasonic image processing system 150, shown in FIG 14, for processing images in an image sequence 4, shown in FIG 6, representing a segment of artery explored along its longitudinal axis. The artery segment 4 shows moving walls such as proximal and distal walls 12 shown in FIG 11-12. As shown in FIG 14 and described on page 6, line 27 to page 7, line 16, the ultrasonic image processing system 150 comprises semi-automatic detection means, such as a detector 151, for detecting the artery walls in an image of the sequence; automatic rigid tracking means, such as a data processing device 153, for tracking corresponding artery walls in other images of the sequence; and evaluation means, such as a data processing device 153, for evaluating artery wall motion and distensibility. The system 150 further includes viewing means, such as a screen 154, for visualizing the images together with parameters that include the distensibility being a ratio of dilation by a diameter of the artery, as described on page 11,

lines 5-9.

The present invention, for example, as recited in independent claim 13, is directed to an ultrasonic medical image processing method. As shown in FIG 2 and described on page 5, lines 5-9, the method comprises acquiring 21 a sequence of ultrasound images, using an array of transducer elements; and detecting 22 anomalies in arteries. As shown in FIG 2 and described on page 5, lines 10-13, page 6, lines 17-18, and page 11, lines 5-9, the detecting comprises semi-automatic detecting the artery walls in a reference image of the sequence; automatic rigid tracking 23 of the corresponding artery walls in other images of the sequence; evaluating 24 the artery wall motion and distensibility; and visualizing 25 the ultrasound images together with parameters that include the distensibility being a ratio of dilation by a diameter of the artery.

The present invention, for example, as recited in independent claim 15, is directed to an image processing system 150, shown in FIG 14, for processing images in a sequence 4, shown in FIG 6, representing a segment of artery explored along its longitudinal

axis, where the segment shows moving walls, such as proximal and distal walls 12 shown in FIG 11-12. As shown in FIG 14 and described on page 6, line 27 to page 7, line 16, and page 11, lines 5-9, the ultrasonic image processing system 150 comprises a processor 153 configured to track artery walls detected in an image of the sequence in other images of the sequence; evaluate artery wall motion and distensibility for display of the images together with parameters that include the distensibility being a ratio of dilation by a diameter of the artery.

GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Whether claims 1, 7, 11 and 13-14 of U.S. Patent Application Serial No. 10/538,621 are unpatentable under 35 U.S.C. §103(a) over U.S. Patent No. 5,938,606 (Bonnefous-606) in view of U.S. Patent No. 5,579,771 (Bonnefous-771).

Whether claims 2-6 of U.S. Patent Application Serial No. 10/538,621 are unpatentable under 35 U.S.C. §103(a) over Bonnefous-606 in view of Bonnefous-771 and U.S. Patent No. 6,508,768 (Hall).

Whether claims 9-10 of U.S. Patent Application Serial No. 10/538,621 are unpatentable under 35 U.S.C. §103(a) over Bonnefous-606 in view of Bonnefous-771 and U.S. Patent Application Publication 2001/0031921 (Bonnefous-921).

Whether claim 12 of U.S. Patent Application Serial No. 10/538,621 are unpatentable under 35 U.S.C. §103(a) over Bonnefous-606 in view of Bonnefous-771 and Hall.

Whether claims 15-16 of U.S. Patent Application Serial No. 10/538,621 are unpatentable under 35 U.S.C. §103(a) over U.S. Patent Application Publication 2001/0039382 (Bonnefous-382).

Whether claim 17 of U.S. Patent Application Serial No. 10/538,621 are unpatentable under 35 U.S.C. §103(a) over Bonnefous-382 in view of and Hall.

ARGUMENT

Claims 1, 7, 11 and 13-14 are said to be unpatentable over Bonnefous-606 in view of Bonnefous-771.

Appellants respectfully request the Board to address the patentability of independent claims 1, 13 and 15, and further claims 2-7, 9-12, 14 and 16-17 as depending from claims 1 and 15, based on the requirements of independent claims 1 and 15. This position is provided for the specific and stated purpose of simplifying the current issues on appeal. However, Appellants herein specifically reserve the right to argue and address the patentability of claims 2-7, 9-12, 14 and 16-17 at a later date should the separately patentable subject matter of 2-7, 9-12, 14 and 16-17 later become an issue. Accordingly, this limitation of the subject matter presented for appeal herein, specifically limited to discussions of the patentability of independent claims 1, 13 and 15 is not intended as a waiver of Appellants' right to argue the patentability of the further claims and claim elements at that later time.

On page 3 of the Final Office Action, column 5, line 51 to column 6, line 30 and claim 5 of Bonnefous-771 are cited in an attempt to allegedly show visualizing the images together with parameters that include the distensibility being a ratio of dilation by a diameter of the artery, as recited in independent claims 1 and 13.

It is respectfully submitted that a careful reading of column 5, line 51 to column 6, line 30 and claim 5 of Bonnefous-771 indicates a disclosure related to temporal integration and a discussion of healthy and damaged arteries. For example, the linear relationship between variation of the diameter of the artier and pressure is noted and equations provided relating flow rate and pressure in an elastic tube.

It is respectfully submitted that the noted sections of Bonnefous-771 are completely silent and do not teach or suggest "viewing means for visualizing the images **together with** parameters that include the distensibility being a ratio of dilation by a diameter of the artery," (emphasis added) as recited in amended independent claim 1, and similarly recited in independent claim 13.

Assuming, arguendo, that Bonnefous-771 and Bonnefous-382 do disclose calculating distensibility as a ratio of dilation by a diameter of the artery, there is still no teaching or suggest of visualizing the images **together with** the distensibility, as recited in independent claims 1 and 13. Further, viewing means for visualizing particular information, namely, images together with the distensibility which is a ratio of dilation by a diameter of the artery, is a structural limitation requiring the visualizing of images together with the distensibility on viewing means, such as the screen 154 shown in FIG 14 of the present application. Accordingly, the display of images together with the distensibility on viewing means should be accorded patentable weight.

Accordingly, it is respectfully requested that independent claims 1 and 13 be allowed. In addition, it is respectfully submitted that claims 7, 11 and 14 should also be allowed at least based on their dependence from independent claim 1.

Claims 2-6 are said to be unpatentable over Bonnefous-606 in view of Bonnefous-771 and Hall.

It is respectfully submitted that claims 2-6 should be allowed at least based on their dependence from independent claim 1.

Claims 9-10 are said to be unpatentable over Bonnefous-606 in view of Bonnefous-771 and Bonnefous-921.

It is respectfully submitted that claims 9-10 should be allowed at least based on their dependence from independent claim 1.

Claims 12 is said to be unpatentable over Bonnefous-606 in view of Bonnefous-771 and Hall.

It is respectfully submitted that claim 12 should be allowed at least based on its dependence from independent claim 1.

Claims 15-16 are said to be unpatentable over Bonnefous-382.

On page 8 of the Final Office Action, paragraphs [0054] to [0056] of Bonnefous-382 are cited in an attempt to allegedly show a processor configured to "evaluate artery wall motion and distensibility for display of the images together with parameters that include the distensibility being a ratio of dilation by a diameter of the artery," as recited in independent claim 15.

It is respectfully submitted that a careful reading of paragraphs [0054] to [0056] of Bonnefous-382 reveals that the noted paragraphs describe determining the starting points of a cardiac cycle by analyzing temporal variation of the mean arterial dilation and representing dilation curves in relation to the starting points.

Assuming, arguendo, that Bonnefous-382 discloses calculating distensibility as a ratio of dilation by a diameter of the artery, there is still no teaching or suggest of visualizing the images together with the distensibility, as recited in independent claim 15.

Accordingly, it is respectfully requested that independent claim 15 should be allowed. In addition, it is respectfully submitted that claim 16 should also be allowed at least based on its dependence from independent claim 15.

Claim 17 is said to be unpatentable over Bonnefous-382 in view of and Hall.

It is respectfully submitted that claim 17 should be allowed at least based on its dependence from independent claim 15.

In addition, Appellants deny any statement, position or averment of the Examiner that is not specifically addressed by the foregoing argument and response. Any rejections and/or points of argument not addressed would appear to be moot in view of the presented remarks. However, the Appellants reserve the right to submit further arguments in support of the above stated position, should that become necessary. No arguments are waived and none of the Examiner's statements are conceded.

CONCLUSION

Claims 1-7 and 9-17 are patentable over Bonnefous-606, Bonnefous-771, Hall, Bonnefous-921 and Bonnefous-382.

Thus, the Examiner's rejections of claims 1-7 and 9-17 should be reversed.

Respectfully submitted,

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CLAIMS APPENDIX

1.(Previously Presented) Ultrasonic image processing system, for processing images in an image sequence representing a segment of artery explored along its longitudinal axis, said artery segment showing moving walls; this system comprising:

semi-automatic detection means for detecting the artery walls in an image of the sequence;

automatic rigid tracking means for tracking corresponding artery walls in other images of the sequence;

evaluation means for evaluating artery wall motion and distensibility; and

viewing means for visualizing the images together with parameters that include the distensibility being a ratio of dilation by a diameter of the artery.

2.(Previously Presented) The system of Claim 1, wherein the semi-automatic detection means is a user assisted artery wall detection means comprising user interaction means for:

selecting a reference image as a starting image among the images of the sequence;

drawing lines, called paths, representing the artery walls in the starting image, assisted by a path search technique based on the minimization of a cost function.

3.(Previously Presented) The system of Claim 2, wherein the user interaction means for drawing a path representing a wall comprises means for:

selecting a starting pixel in the starting image for creating a new path structure;

drawing a portion of the path between the starting pixel and a second selected pixel in the starting image;

evaluating the cost function of the portion of the path as a sum of the cost of individual pixels that constitute the path;

selecting an optimal path as the path that minimizes the cost function;

memorizing the optimal path;

drawing portions of path between successive pixels; and

performing the operations of evaluating respective cost functions, selecting optimal paths and memorizing the optimal paths until a complete path is drawn for the artery wall.

4.(Previously Presented) The system of Claim 3, having means for estimating the cost of the individual pixels based on a gradient at a pixel in the image.

5.(Previously Presented) The system of one of claim 3, wherein the automatic rigid tracking means for tracking the corresponding artery walls in other images of the sequence comprises means of path finding including means for:

defining regions of interest (ROIP, ROID) around the paths drawn in the starting image and using the same regions of interest in the other images of the sequence;

selecting a current image next to the starting image;

initializing the tracking of the paths in the current image by using positions of the paths in the starting image;

applying translations to initial paths in the current image to

fit the walls in the current image;

evaluating the cost of the paths in the current image using the same cost function as in the starting image and finding the translations that minimizes the cost function;

iterating until a beginning and an end of the sequence are reached.

6.(Previously Presented) The system of Claim 5, wherein means for evaluating the cost performs cost evaluation of the individual pixels based on a gradient at the pixel in the ultrasonic images calculated for all the images of the sequence, considered as a two-dimensional images corresponding to a volume over a period of time.

7.(Previously Presented) The system of claim 1, further comprising computation means for calculating dilation of the artery along ultrasound beams in the images of the sequence using segmentation of the walls performed by path finding with semi-automatic detection and rigid tracking.

Claim 8 (Canceled)

9.(Previously Presented) The system as claimed in claim 1, further comprising color display means to display colored paths for the artery walls and colored patterns for dilation of the artery walls, superimposed on the ultrasonic images.

10.(Previously Presented) The system as claimed in claim 1, further comprising a suitably programmed computer of a workstation or a special purpose processor having circuit means, which are arranged to process the images, having means to display the processed images, and having a user interface to permit a user of interacting on the respective images of the sequence in order to display quantified parameters related to the artery walls.

11.(Previously Presented) A computer readable storage medium comprising a computer program product comprising a set of instructions to be used in a system as claimed in claim 1.

12.(Previously Presented) The system as claimed in claim 1, further comprising a curved transducer array.

13.(Previously Presented) An ultrasonic medical image processing method comprising acts of:

acquiring a sequence of ultrasound images, using an array of transducer elements,

detecting anomalies in arteries, wherein the detecting act comprises the acts of:

semi-automatic detecting the artery walls in a reference image of the sequence;

automatic rigid tracking of the corresponding artery walls in other images of the sequence;

evaluating the artery wall motion and distensibility; and

visualizing the ultrasound images together with parameters that include the distensibility being a ratio of dilation by a diameter of the artery.

14.(Previously Presented) An ultrasound examination apparatus

having means to acquire ultrasound images and coupled to an image processing system according to claim 1.

15.(Previously Presented) An image processing system for processing images in a sequence representing a segment of artery explored along its longitudinal axis, said segment showing moving walls; the system comprising a processor configured to:

track artery walls detected in an image of the sequence in other images of the sequence;

evaluate artery wall motion and distensibility for display of the images together with parameters that include the distensibility being a ratio of dilation by a diameter of the artery.

16.(Previously Presented) The image processing system of claim 15, wherein the artery walls are detected through user interaction.

17.(Previously Presented) The image processing system of claim 15, wherein the artery walls are detected through user

interaction combined with live-wire detection including:

selecting a reference image as a starting image among the images of the sequence; and

drawing paths representing the artery walls in the starting image, assisted by a path search technique based on the minimization of a cost function.

EVIDENCE APPENDIX

None

RELATED PROCEEDINGS APPENDIX

None